

EXCAVATION SCENARIO  
CARCINOGENS

October 2003

Cancer Risk Formula (with volatilization factor):

$$Cs = [(TR * BWa * AT) / (EF * ED * ((SFo * CF * IRSa) + (SFi * IRAa * (1/VF + 1/PEF)) + (SFo * CF * RAFd * DFA)))]$$

<b>BENZENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	81
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; IRIS, September 2003)	5.50E-02
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
SFi (Chemical specific inhalation slope factor - kg-day/mg; IRIS, September 2003)	2.70E-02
IRAA (Adult inhalation rate - m^3/day; EPA, August 1997)	20
VF (Volatilization factor - m^3/kg; EPA, May 1996)	3133
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.05
DFA (Adult dermal factor - mg/day; EPA, August 1997)	121

Cancer Risk Formula (without volatilization factor):

$$Cs = [(TR * BWa * AT) / (EF * ED * ((SFo * CF * IRSa) + (SFi * IRAa * 1/PEF) + (SFo * CF * RAFd * DFA)))]$$

<b>BENZ(A)ANTHRACENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	176
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E-01
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRAA (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFA (Adult dermal factor - mg/day; EPA, August 1997)	121

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<b>BENZO(A)PYRENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	18
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; IRIS, September 2003)	7.30E+00
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121

<b>BENZO(B)FLUORANTHENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	176
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E-01
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121

<b>BENZO(K)FLUORANTHENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	1,762
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E-02
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121

<b>DIBENZO(A,H)ANTHRACENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	18
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E+00
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121

<b>CHRYSENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	17,623
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E-03
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121

<b>INDENO(1,2,3-CD)PYRENE</b>	
Parameters	Values
Cs (Soil concentration - mg/kg)	176
TR (Target cancer risk)	1.E-06
BWa (Adult body weight - kg; EPA, August 1997)	70
AT (Averaging time - day; EPA, December 1991)	25550
EF (Exposure frequency - day/yr; DEQ)	124
ED (Exposure duration - yr; DEQ)	1
SFo (Chemical specific oral cancer slope factor - kg-day/mg; EPA, March 1993)	7.30E-01
CF (Conversion factor - kg/mg; EPA, December 1991)	1.E-06
IRSa (Adult soil ingestion rate - mg soil/day; EPA, August 1997)	100
IRRa (Adult inhalation rate - m^3/day; EPA, 1997)	20
PEF (Particulate emission factor - m^3/kg; EPA, May 1996)	1.10E+09
RAFd (Chemical specific dermal relative absorption factor - unitless; EPAIII, Dec. 1995)	0.1
DFa (Adult dermal factor - mg/day; EPA, August 1997)	121